

DRAFT

Plants

The field portion of this limited survey of WAG 7 was conducted on 6 September 1996. The four target species were not observed during this survey.

WAG 7 is near the south end of the site in areas characterized by lava flows, sand deposits, and gravel deposits east of the Big Lost River. All four of the species of concern in this survey occur in the northern portions of the site in the rocky foothills. The required habitats for the survey species were not found in the area and the target species are not to be expected in the WAG area or its immediate vicinity.

Historical Sightings and Anticipated Future Use

There are no records of the occurrence of these species at WAG 7 in the past and numerous searches by Glennon over the last six years and during this survey found no evidence of the species in the WAG area. The habitat requirements and their present distribution on the INEEL support the conclusion that these species are not expected to occur on this WAG.

WAG 9

Burrowing Owl

The burrowing owl habitat survey was conducted at WAG 9 on August 21, 1996. No optimal habitat for burrowing owl reproduction was located within 200 m of the WAG 9 perimeter. During habitat surveys, we observed no signs (droppings, pellets, etc. at potential nest burrows) nor did we observe any living or dead burrowing owls on the survey areas.

In the 200-m perimeter surrounding WAG 9, none of the habitat was type 1 (optimal nesting habitat), 33 % of the habitat was type 2 (moderate nesting habitat), 52 % of the habitat was type 3 (low use nesting habitat), and 15 % was type 4 (unsuitable nesting habitat).

Historical Sightings and Anticipated Future Use

We found 15 burrowing owl nests on the INEEL in 1996, but none were located within 600 m of any WAG. Similarly, of the 6 nests found by Gleason (1978), all were greater than 600 m from facilities. However, breeding bird surveys recorded four burrowing owls on the ANL-W (WAG 9) route (Table 7). At least one recorded sighting at WAG 9 was within or very near 600 m from the perimeter.

Burrowing owls often return to previously used sites, thus WAG 9 is a likely candidate site for burrowing owl use in the future.

Raptors

Nesting Target Species

During our studies on the INEEL from 1991-1993, we observed one active ferruginous hawk nest within 6 km of WAG 9 (Table 4). That nest was occupied in two consecutive years (1992 and 1993) and may still be active. The nest is located in an isolated Utah juniper at 48249 N, 3612 E.

Additional scattered Utah junipers are within 6 km of WAG 9 and could be used by nesting ferruginous hawks.

Wintering or Migrating Target Species

L. D. Flake observed a peregrine falcon perched on a power line about 1.5 km north of WAG 9 in July of 1996--several other records of peregrine falcons on the INEEL have been reported. Peregrines may perch or feed near all of the WAGs at various times but few individuals visit the INEEL. Northern goshawks were observed in small numbers by Craig (1979) but were not observed by Hansen (1994).

Anticipated Future Use

WAG 9 will remain within the potential home range of nesting pairs of ferruginous hawks due to the availability of nearby nesting substrates. Population recovery in the peregrine falcon will likely increase the occurrence of this species on the INEEL as a migrating or

DRAFT

wintering raptor. Nesting is not likely near WAG 9.

Estimated Site/Area Population

One of the currently identified ferruginous hawk nests on the INEEL was within 6 km of WAG 9. None of the recent observations of bald eagles were near WAG 9. Despite the nearby observation, numbers of peregrine falcons and northern goshawks are low enough that short term surveys would likely indicate zero populations.

Breeding Birds

The BBS survey route around WAG 9 is 5.8 km long with 18 stops. Stops were 0.32 km apart. The habitat along the route is described by the BBS surveyors (Belthoff et al. In press) as 80 % big sagebrush, green rabbitbrush, and bottlebrush squirreltail; and 20 % Great Basin wildrye (*Leymus cinereus*), green rabbitbrush, and bluebunch wheatgrass.

Two of the species of concern appeared in the BBS around WAG 9 from 1985 through 1991: burrowing owl and loggerhead shrike (Table 4). There were six observations of burrowing owl. Because burrowing owls tend to return to the same locations to nest, observations on consecutive years may represent the same birds. Twenty-seven loggerhead shrikes were observed during the period 1985-1996 (Table 4).

Anticipated Future Use

Both species observed at WAG 9 have used the area over a period of several years and will likely continue to do so. Given that so little information is available on burrowing owl hunting habitat, use of contaminated areas near ANL-W to obtain food, cannot be ruled out. Loggerhead shrikes are known to frequent areas of human habitation and have been observed inside contaminated areas. It is likely that shrikes will continue to use the area around WAG 9 and they may become contaminated.

Estimated Site/Area Population

We estimated the density of burrowing owls and loggerhead shrikes at WAG 9 to be 0.5 and 2 km⁻², respectively.

Sagebrush Lizard

WAG 9 was surveyed on August 22, 1996. This survey resulted in the detection of one sagebrush lizard (?).

The survey consisted of walking around the outside fence of Argonne, moving counterclockwise beginning at the main parking lot at the southeast corner of the facility. The weather was clear, mild, and calm, with a 0930 air temperature of 18 C and a 1200 temperature of 25 C. The northeast and east ends of the facility appear to be the least disturbed, and consist mainly of sagebrush and rabbitbrush communities. One rocky outcrop along the east end of Argonne is the only natural rocky area found within 100 m of the facility. Areas in the north, west, and south are disturbed, and consist of patchy sagebrush habitat.

No lizards were observed during the initial transect survey. The lizard was observed during the last half of the time constrained search at 1230 in the rocky outcrop 60 m east of the facility. The lizard was an adult male, and was found running on a basalt rock.

This area appears to be suitable sagebrush lizard habitat, although some areas seem to be better habitat than others. Sagebrush lizards also have been seen close to the facility in the past.

Historical Sightings and Anticipated Future Use

Sagebrush lizards have been previously observed near the ANL-W in 1994. We expect that lizards will continue to inhabit the area in the future.

Bats

The bat surveys were conducted at the WAG 9 sewage lagoons on August 19, 1996. The sky was clear; the wind was calm; the high

DRAFT

temperature was 11.8 °C and the low was 8.1 °C. Six bats were found at WAG 9 using acoustical surveys. Two, the big brown bat and the Brazilian free-tailed bat (*Tadarida brasiliensis*), are not species of interest. However, two small-footed myotis were observed; one passing through the area and one actively hunting; and another unidentified myotis passed through (Table 5). In addition, a single bat of unknown species was observed drinking from one of the sewage ponds.

Historical Sightings and Anticipated Future Use

Keller et al. (1993) reported detecting four individual bats (big brown bat, two small-footed myotis, and one unidentified myotis) at WAG 9. The big brown bat is not a target species for this survey. The unidentified myotis may have been a small-footed myotis. In this survey two small-footed myotis were found in the area and one was actively hunting. A third, unidentified myotis also passed through the area during the survey. This implies that further use of the WAG 9 ponds can be expected by these species.

Merriam's Shrew

The pitfall trap for this survey was constructed on September 21, 1996 near the WAG 9 industrial waste pond (43°35.9360' N, 112°39.3954' W, at an elevation of 1415 m, as determined by GPS). On September 28, 1996 we collected one montane vole. No Merriam's shrews were collected.

Historical Sightings and Anticipated Future Use

There are no historical records of Merriam's shrews at WAG 9 and we did not observe them during this survey.

Gray Wolf

Since 1990, there have been 12 wolves seen in nine separate reports on or near the INEEL (Table 3). Most sightings have occurred on the north end of the site at the mouth of the Birch

Creek Valley. However, two unconfirmed sightings did occur on the eastern boundary of the site, both north and south of WAG 9.

Pygmy Rabbit

The initial GIS screening indicated that appropriate habitat did occur in this area. The survey was conducted on the September 7, 1996. Weather conditions were clear.

An area approximately 250 m around the fence encompassing the WAG was searched systematically at 100 m intervals. No appropriate pygmy rabbit habitat occurred within the boundary of the WAG. and no pygmy rabbit sign was found.

Historical Sightings and Anticipated Future Use

No pre-existing data are available on the occurrence of pygmy rabbits at this WAG site. Based on this survey, we do not expect pygmy rabbits to inhabit the area immediately surrounding WAG 9.

Plants

The field portion of this limited survey of WAG 9 was conducted on 8 September 1996. The four target species were not observed during this survey.

WAG 9 is near the southeast end of the site in areas characterized by lava flows and scattered playas. All four of the species of concern in this survey occur in the northern portions of the site in the rocky foothills. The required habitats for the survey species were not found in the area and the target species are not to be expected in the WAG area or its immediate vicinity.

Historical Sightings and Anticipated Future Use

There are no records of these species' occurrence at WAG 9 in the past and numerous searches by Glennon over the last six years and during this survey found no evidence of the species in the WAG area. The habitat

DRAFT

requirements and their present distribution on the INEEL support the conclusion that these species are not expected to occur on this WAG area.

WAG-wide Summary

Burrowing Owl

The burrowing owl habitat surveys were conducted at the WAGs from August 19-21, 1996. Weather conditions were not recorded because they were irrelevant to this habitat survey. No optimal habitat for burrowing owl reproduction was located within 200 m of any WAG perimeter. During habitat surveys, we observed no signs (droppings, pellets, etc. at potential nest burrows) nor did we observe any living or dead burrowing owls on the survey areas.

In the 200-m perimeter surrounding each the WAGs, none of the habitat was type 1 (optimal nesting habitat), 19% was type 2 (moderate nesting habitat), 21 % was type 3 (low use nesting habitat), and 60 % was type 4 (unsuitable nesting habitat). WAGs 2, 6, and 7 are the only WAGs without any type 1 or type 2 habitats within the 200-m perimeter survey area. Of these, only WAG 2 has a significant amount of grassland located within 1 km of its perimeter that may be occupied by nesting burrowing owls. If they exist, these owls would potentially hunt within the contaminated area of the WAG. WAGs 6 and 7 are surrounded almost exclusively by dense sagebrush (type 4 nesting habitat) out to at least 600 m beyond their perimeters. Therefore, it is unlikely that burrowing owls would be found nesting nearby or that hunting burrowing owls from other areas would enter the contaminated area of these WAGs.

Historical Sightings and Anticipated Future Use

We found 15 burrowing owl nests on the INEEL in 1996, but none were located within 600 m of any WAG. Similarly, of the 6 nests found by Gleason (1978), all were greater than

600 m from facilities. Breeding bird surveys (BBS) have revealed burrowing owls on the TAN (WAG 1), ICPP (WAG 3), EBR-II (WAG 9), and CFA (WAG 4) routes (Table 7). Burrowing owls often return to previously used sites, thus WAGs 1, 3, 4, and 9 are likely candidate sites for burrowing owl use in the future. Several of the BBS locations are greater than 600 m from WAG perimeters, however, at least one recorded sighting at each of these WAGs was within or very near 600 m from the perimeter.

Estimated Site/Area Population

Based on our previous, unpublished work, the best burrowing owl habitat on the INEEL (at Tractor Flats) has an estimated density no higher than 3 nesting pairs per square kilometer. Very little of this habitat exists on the INEEL and none exists around any of the WAGs, so densities at the WAGs are expected to be much lower.

Raptors

Nesting Target Species

During 1991 - 1993, active ferruginous hawk nests were observed within 6 km of WAGs 1,2,3,6, and 9 (Table 4). Because of nest-site fidelity these nests likely remain active.

Utah junipers are scattered across the INEEL, within 6 km of every WAG, and could be used by nesting ferruginous hawks. WAGs within 6 km of the Big Lost River have narrowleaf cottonwood substrates that could be used by nesting ferruginous hawks. The other target species are not known to be nesting on INEEL.

Wintering or Migrating Target Species

The northern and western portions of the INEEL are potential hunting habitat for bald eagles. Peregrine falcons have been observed in small numbers in several locations on the site including one observation within 1.5 km of WAG 9. Peregrines may perch or feed near all of the WAGs at various times but few individuals visit the INEEL. Northern goshawks

DRAFT

Table . Locations of burrowing owl sightings on the Breeding Bird Survey (BBS) route at Idaho National Engineering and Environmental Laboratory Waste Area Groups (WAGs) 1-9. Locations (in the Universal Transverse Mercator system) were determined at the stop on the route by a geographic positioning system (GPS).

Year	WAG	BBS Stop Number	Northing (m)	Easting (m)
1994	1	22	4856374.863	365368.007
1990, 1994	1	13	4854795.933	364381.911
1994	1	10	4854219.487	364536.880
1994	1	12	4854548.631	364570.621
1985	3	1	4824676.284	344361.634
1985	4	3	4820606.011	342316.584
1985, 1986	9	15	4828048.705	366723.448
1985	9	11	4828687.098	366226.268
1986	9	13	4828662.003	366705.986
1986	9	17	4827532.603	366636.639

are probably present on the INEEL in small numbers but, because of poor habitat, will likely never be abundant.

Anticipated Future Use

Populations of ferruginous hawks are expected to remain stable on the INEEL except for minor declines due to loss of cottonwood trees. Artificial nesting platforms could help offset such losses. Thus, all the WAGs will remain within the potential home range of nesting pairs. Nesting ferruginous hawks are sensitive to human activity so development of additional facilities in some portions of the INEEL could be detrimental to the population.

As the bald eagle population continues to recover, population size on the INEEL may increase. This may lead to greater use of the northern and western areas of the INEEL as hunting grounds.

Population recovery in the peregrine falcon will likely increase the occurrence of this

species on the INEEL as a migrating or wintering raptor. Nesting is not likely near any WAG. Peregrine falcons have adapted to nesting on tall buildings in some large cities in North America but it is very unlikely these raptors would nest on buildings on the INEEL.

Observations of northern goshawks by Craig (1979) and their absence in 1991-1993 studies (Hansen 1994) may indicate further decline in this species. However, most of the INEEL is poor habitat for this species.

Estimated Site/Area Population

Recent studies indicate a range of 11-15 nesting pairs of ferruginous hawks on the INEEL. These numbers are probably close to current populations. Several ferruginous nests occupied in 1993 were checked by L. D. Flake in summer of 1996 and occupancy rates remained high.

Hansen (1994) observed only 3 bald eagles within the INEEL boundaries during extensive

DRAFT

roadside surveys from January to May in 1992 through 1993.; they are sometimes quite abundant on nearby agricultural lands when black-tailed jackrabbits are concentrated in small areas. Numbers of peregrine falcons are extremely low on the INEEL as are northern goshawks. Numbers of the latter species are low enough that short term surveys would likely indicate zero populations.

Breeding Birds

Breeding Bird Survey routes on the INEEL are divided between eight facility routes and five remote routes. The facility routes total 74 km with 243 stops around eight facilities. The Naval Reactors Facility (WAG 8) is excluded from this assessment, so the routes of interest total 67.6 km in length with 223 stops around seven facilities. Stops were 0.32 km apart and birds were counted within a radius of 0.15 km. The habitat along the routes is variable but is primarily dominated by sagebrush, with some areas of mixed grasses (Belthoff et al. In press). The remote routes total 200 km in length with 250 stops 0.8 km apart. Birds were counted in a radius of 0.4 km.

Four of the five species of concern appeared on the BBS routes from 1985 through 1996: loggerhead shrike, ferruginous hawk, burrowing owl, and long billed curlew (Table 4, Table 8). There was no significant difference between remote and facility routes although the facility routes were more variable.

Anticipated Future Use

All these species have demonstrated a tendency to use the INEEL, including areas surrounding the WAGs over a period of several years. We expect them to continue doing so.

Estimated Site/Area Population

Table 8 reports the estimated densities of the four target species observed in the BBS. These estimates assume that habitat, and thus species, are evenly distributed over the site. Because the site is not a uniform habitat type, some species will occur in much higher

densities in some locations while not appearing at all in other locations; long-billed curlews, for example, have never been observed on a facility route. Thus, these estimates can only serve as a very rough approximation for any given location.

Belthoff, et al. (In press) report that, over the entire site, loggerhead shrikes and ferruginous hawks had a negative, but statistically non-significant, trend mean. This may indicate that land management practices such as grazing or facility operations are negatively impacting populations of this species. Dobkin (1994) reported that loggerhead shrikes in Idaho had a stable population mean but with wide annual variation.

Sagebrush Lizard

These surveys were conducted on August 22-30, 1996. Fifteen sagebrush lizards and one short-horned lizard were observed at all WAGs (?).

The habitat in which the lizards were found can be divided into three main categories. About 47% of the sagebrush lizards observed were found in or near natural basalt outcrops. Exactly 20% were detected on or under man-made wooden items lying on the ground, such as stacked lumber. The remaining sagebrush lizards were found in a mixture of big sagebrush and crested wheatgrass plant communities.

The average air temperature at which the lizards were observed was 26.4°C. Lizards were observed at air temperatures ranging from 19 to 34 C. A substrate temperature was also measured when a lizard was observed. The substrate was considered to be the medium upon which the lizard was first observed. The average substrate temperature was 36.8°C.

The majority of the sagebrush lizards (67%) were detected during the primary walk-around survey. About 25% of the lizards were detected during the 1 hour time-constrained search. Only one lizard was located during a transect search.

We detected primarily adults sagebrush lizards (73%). Approximately 20% of the sagebrush lizards found were hatchlings, and the

DRAFT

Table . Species of special concern identified by the Breeding Bird Survey (BBS) from 1985 through 1996 on the INEEL. Except as noted, these summary data include WAG 8. Adapted from Belthoff et al. (1998).

Common Name	Total number observed	Routes		Annual number observed		Estimated Density ³ km ⁻²
		Remote ¹	Facility ²	Mean	Standard Deviation	
loggerhead shrike	280	5	7	30	21.0	0.2
ferruginous hawk	95	5	5	12	4.1	0.07
burrowing owl	13	4	4	2	3.9	0.009
long-billed curlew	3	1	0	0.9	1.6	0.002

¹Number of remote routes on which the species was observed.

²Number of facility routes on which the species was observed.

³See text for method of calculation. These calculations excluded WAG 8 results.

remainder were juveniles. Sex was determined for only a few lizards observed. In the majority of lizards observed, we could not determine sex. Three female and 4 male sagebrush lizards were identified during this survey.

We found the single short-horned lizard near WAG 5 in a sagebrush and crested wheatgrass habitat. The detection of only one lizard during the survey probably indicates that the densities of short-horned lizards are be less than the densities of sagebrush lizards.

Although the scope of these surveys was limited, lizards were found at all WAG areas except WAG 1, the TAN area. It is likely that sagebrush lizards do occur in this area and were simply not observed. In order to determine the distributions and population densities of this species, future studies around the WAGs need to be done. Mark-recapture techniques would be required to determine actual densities.

For more detailed descriptions of the survey of each WAG, refer to the individual WAG summary reports. The dot-distribution map (Fig. 1) gives a visual description of the lizards found near each WAG site.

Historical Sightings and Anticipated Future Use

Sagebrush lizards have been previously observed near all WAGs. We expect that lizards will continue to inhabit the area in the future.

Estimated Site/Area Population

As expected, sagebrush lizards were observed in low numbers at the WAGs during the survey. An average of 1.5 sagebrush lizards was seen per survey day. This slightly exceeds the number of lizards seen per day from 0900 - 1300 by Guyer (1985). Detection rates ranged from no lizards at WAG 1 (surveyed on two different days) to seven lizards at WAG 4. Because of the low lizard detection rates and the limited scope of this survey, accurate density estimates were not obtained. However, population densities of both sagebrush lizards and short-horned lizards were measured by Guyer (1978) on the INEEL. His data represent a 1977 population estimate for these two species in a 1 ha grid approximately 4 km southeast of WAG 9. At the time, this grid represented high-quality habitat for sagebrush lizards. During the 1977 season, an estimated 14 sagebrush lizards and 16 short-horned lizards inhabited the grid

DRAFT

Fig. 1. Dot distribution map of sagebrush lizard (*Sceloporus graciosus*) on the Idaho National Engineering Laboratory.

DRAFT

site. Although these data cannot be projected into population estimates for the 1996 survey, they probably represent the high end of the lizard populations around the WAGs.

Bats

The only target species found during these surveys was the small-footed myotis. This bat was detected 12 times at five WAGs and was always associated with a water source (Table 5). In addition, two unidentified myotis were discovered which could have been one of the target myotis.

Historical Sightings and Anticipated Future Use

Keller et al. (1993) reported detecting small-footed myotis and unidentified myotis at WAGs 3 and 9. Although they surveyed WAG 4, they did not detect bats. The unidentified myotis may have been a target myotis. The results of this survey, combined with the historical results indicates that *Myotis* spp. may be expected to inhabit those WAGs where water is present. Because bats move long distances to feeding areas, the absence of bats in this survey does not imply that bats are never present. The absence of Townsend's big-eared bats in these surveys confirms results found in earlier surveys and may indicate that this species tends to avoid human inhabited areas.

Merriam's Shrew

Pitfall traps were constructed at WAGs 1-4 and 9 on September 21, 1996. They were constructed at WAG 6 on September 22, 1996 and at WAG 7 on September 29, 1996. Where possible, the traps were constructed near a water source. The traps were operated for at least two trap nights each. Merriam's shrews were collected in only one location; near the sewage lagoons at WAG 4 (43°31.3830' N, 112°55.9992' W, at an elevation of 1620 m, as determined by GPS). This is an area of sagebrush habitat with abundant water sources nearby.

Historical Sightings and Anticipated Future Use

Merriam's shrews are known to inhabit the INEEL. Mullican (1985) trapped an unknown number of shrews near WAG 6 and, in this survey, two were collected at WAG 4. They will likely continue to inhabit areas near WAG 4. Their absence at most WAGs in this survey is likely an artifact of the limited number of trap hours. As noted above, Merriam's shrews are uncommon throughout their range and are thus difficult to detect. Based on the information available, we cannot estimate the likelihood that Merriam's shrews will, or will not, inhabit WAGs other than WAG 4 in the future.

Gray Wolf

Since 1990, there have been 12 wolves seen in nine separate reports on or near the INEEL (Table 3). Most sightings have occurred on the north end of the site at the mouth of the Birch Creek Valley implying that WAG 1 is most likely to impacts wolves. However, two unconfirmed sightings did occur on the eastern boundary of the site, both north and south of WAG 9.

Pygmy Rabbit

The initial GIS screening indicated that appropriate habitat did occur at all WAGs except WAG 1. The surveys at all other WAGs were conducted on September 7-8 and 14-15, 1996. Weather conditions were clear on all four days.

An area approximately 250 m around the fence encompassing each WAG surveyed was searched systematically at 100 m intervals. Pygmy rabbit habitat was discovered at WAGs 2 and 4. Two pygmy rabbit burrows and scat were found at WAG 2. Because of the size of the area, it likely supported less than 10 animals. Deserted and collapsed burrows were found at WAG 4 along with old scat indicating past use by the animals. At higher population densities, it is likely that both of these areas would be

DRAFT

recolonized. We did not find evidence of pygmy rabbits at any other locations.

Historical Sightings and Anticipated Future Use

No pre-existing data are available on the occurrence of pygmy rabbits at any of the WAGs other than unconfirmed, anecdotal evidence at WAGs 3 and 9. Given the lack of appropriate habitat in these areas, we do not expect pygmy rabbits to inhabit them in the future. However, it is likely that pygmy rabbits will inhabit areas near WAGs 2 and 4 as populations increase.

Plants

The field portion of this limited survey of the WAGs was conducted on 6-8 September 1996. The four target species were not observed at WAGs 1-7 and 9.

The T&E species being surveyed in this study have only been found to occur in the north and northwest foothills of the site, including the Lemhi and Beaverhead mountains. WAG 1 is the area closest to the occurrence of all four of the species of concern in this survey. WAG 10, sites throughout the INEEL not associated with other WAGs, would encompass the known locations of the target species.

The habitats around WAG 1 are a complex mixture of loess and saltbush playas, wind-blown sand and well-drained gravel beds. The habitats of the WAG 9 (ANL-W) area are a complex of lava flows, wind-blown sand and playa areas. Around all other WAGs in this survey they are a mixture of lava flows, wind-blown sand and gravel deposits.

The required habitats for the survey species were not found in the areas and the target species are not to be expected in the WAG 1-9 areas or their immediate vicinities.

Historical Sightings and Anticipated Future Use

There are no records of these species' occurrence near any of the WAGs in the past and numerous searches by Glennon over the last

six years and during this survey found no evidence of the species in the WAG 1-9 areas. The habitat requirements and their present distribution on the INEEL support the conclusion that these species are not expected to occur in these WAG areas.

WAG 10 includes areas where the species have been found in the past. Plains milkvetch is the most restricted of the four species. It has been found on only one slope in the Beaverhead Mountains, at Reno point, and is very uncommon there. Wing-seeded evening-primrose is also very uncommon. It is found in only a few locations in the foothills of the Lemhi Mountains. Lemhi milkvetch is more abundant but is still uncommon. It is in scattered locations along the foothills of the Lemhi Mountains. Spreading gilia is the most common of the target species. When found they are in a small population, but these populations are not commonly found. They occur in the southern foothills of the Lemhi Mountains.

Estimated Site/Area Population

No systematic evaluation of the sizes of the populations of these four T&E species has occurred in the past. This would need to be done to accurately assess the status of these species. Past observations by Glennon were used as a rough estimate of their numbers on the INEEL. Plains milkvetch on the site is restricted to less than fifteen individuals in one population. Wing-seeded evening-primrose is found in four to five populations of five or six individuals each. Lemhi milkvetch occurs in groups of about ten individuals or less along the foothills of the Lemhi Mountains. The populations are scattered but they are in the range of ten to twenty of these groups of individuals. Spreading gilia is the most common. It has around forty to fifty populations of approximately twenty individuals each.

DRAFT

Surveys of Specific CERCLA Sites Within WAG Boundaries

Methods

On 31 July and 20 August 1997, field surveys were conducted for *individual sites of concern* within WAGs 1-5, and 9. Field surveys for WAG 10 sites were conducted on 29 June and 8 July 1999. The WAG 6 sites of concern were also surveyed on 29 June 1999 and sites for WAG 7 were evaluated on 1 September 1999. An onsite inspection was conducted and each site of contamination was evaluated for habitat qualities and potential to support INEEL species of concern. A suite of site habitat attributes was evaluated with regard to suitability for each species. The attributes evaluated included:

- Size.
- Substrate (gravel, asphalt, lawn, etc.).
- Natural or manmade features that entice wildlife (water, lights, etc.).
- Proximity to areas or sites of facility activity.
- Presence and availability of food or prey.
- Availability of nesting, roosting, or resting habitat.
- Signs of wildlife use.
- Prior history, known sightings, or use.

Attributes were subjectively rated for positive contribution to overall habitat suitability. A rating of high, medium, low, or none was assigned based on the number of positive habitat

features and probability that the species of concern may or does use the site. The convention upon which ratings were assigned for individual habitat attributes are summarized in Table 9. Although T/E and species of concern were of primary consideration, potential use by game species and unique populations (i.e., spadefoot toad, Merriam's shrew) was also assessed. Some sites rated overall as "low" are those having one or two positive attributes and therefore potential for incidental use by wildlife. These sites may generally be discounted as contributing significant chronic exposures to wildlife from Contaminants of Special Concern. The duration and stringency of these surveys was not adequate to verify presence or frequency of species occurrence. These surveys were conducted to provide information to allow evaluation of WAG sites of concern in an ecological context. It should be noted that these ratings are subjective, based on professional opinion supported by limited observation.

Results

Surveys of sites of concern and surrounding areas have been completed for WAGs 1-6, 9, and 10. Detailed results for those WAGs are presented in Table 10 and summarized for sensitive species in Table 11.

DRAFT

Table . Habitat rating conventions for WAG sites of concern.

Attribute	Examples
Size	Areas having physical dimensions too small to support species of interest were rated “none” unless enhanced by other attributes. Large, unconfined areas adequate to support wildlife were assigned higher ratings.
Substrate	Asphalt = none, gravel =low, lawn, soil = medium-high for some species, disturbed vegetation community = medium to high, natural vegetation community = high.
Natural or manmade features	Water = high (water [permanent or ephemeral] is an important component in desert systems); lights = medium (both attract insects and consequently bats and insectivorous birds [i.e., swallows, nighthawks])
Proximity to areas of activity	Proximity to areas or sites of moderate or heavy human activity may reduce desirability. Sites associated with buildings and facilities may be more suitable if abandoned or little used.
Nesting, roosting, or loafing habitat	Structures such as fence and power poles adjacent to open fields afford perches for roosting and hunting etc.
Signs of wildlife use	Signs of wildlife use were considerations that qualitatively fed the evaluation. Examples of these signs included observation of animal tracks, hair, or scat.
Prior history	Documented or reported sightings.

Table . Estimated habitat suitability for species of concern at CERCLA sites within WAG boundaries. Considerations used to define High, Medium, and Low are identified in Table 9.

Site Number	Black Tern	Trumpeter Swan	White- faced Ibis	Burrowing Owl	Ferruginous Hawk	Peregrine Falcon	Loggerhead Shrike	Bald Eagle	Bats	Merriam's Shrew	Pygmy Rabbit	Sagebrush Lizard	Spadefoot toad	Game species	Comments
WAG 1															
TSF-03				M	L	L	L	L	L			L	M		Open crested wheatgrass planting, weeds, no shrubs
TSF-07	H		H	M	M	M	M	M	H	H		M	H		Standing water, cattails, thistle, sagebrush areas, open fencing, roosts near cattails, mud source, swallows, nighthawk, dove sighted
TSF-08				M	M	M	M	M	M			M	H		Unfenced, between road and railroad, adjacent power lines, low shrubs and mustard
LOFT-02				L	M	M	M					M	L	M	Former pond, intermittent water, open fencing, roosts, lush weeds, waterfowl use observed, isolated from active sites
WRRTF-01				M	H	H	L	H				M	H		Crested wheatgrass planting, rabbitbrush, unfenced, adjacent power line, low activity, frequented by antelope
WRRTF-03			L		M	M	M	M	H	H		H	H		Unfenced 3 pond complex, east area dry, piped facility drainage to central area - cattails, thistles, bare soil berm sparse halogeton, perches adjacent to south, borders natural communities, isolated from activity
WRRTF-13									L			L			Paved area, weedy, adjacent poles and lights, old equipment , isolated from activity
WAG 2															
TRA-02				L	L	L	L		L			L	L	L	Terminus of ditch - borrow pit adjacent to paved road, low cover, gravel substrate, intermittent water
TRA-03				M	M	M	M	L	L			M	H		Crested wheatgrass planting, non-differentiated soil cover, small burrows, fence and power pole perches
TRA-04/05				L	L	L	L		L			L			Gravel substrate, open area, sparse kochia, adjacent power poles and structures

A-62

DRAFT

Site Number	Black Tern	Trumpeter Swan	White- faced Ibis	Burrowing Owl	Ferruginous Hawk	Peregrine Falcon	Loggerhead Shrike	Bald Eagle	Bats	Merriam's Shrew	Pygmy Rabbit	Sagebrush Lizard	Spadefoot toad	Game species	Comments
TRA-06				L	L	L	L		M	L		M	L		Chem. pond, fairly deep, gravel berm, intermittent water, shrubs and grasses in bottom, adjacent lighting
TRA-08				M	M	M	M		L	L		M	L	H	Shallow pond with shrub cover, intermittent water, adjacent perches, forage, substandard fencing
TRA-13				L	M	M	M	L	L			M			Shallow ditch with gravel substrate, weed and shrubs, 2-strand wire fence, adjacent native community
TRA-15									L			L			Sparse vegetation, large mesh fence, some cover, adjacent lighting and pole perches
TRA-16															Asphalt adjacent to building
TRA-19									L						Gravel area between buildings, weedy annuals and cheatgrass, remediation planned
TRA-34				L	L	L	L	L	L			L		M	North storage area; large, unfenced, revegetated area, primarily weeds, adjacent pole perches and lighting
TRA-36									L						Gravel substrate, sparse vegetation, adjacent lighting, intermittent water, mud
TRA-38									M						ATR cooling towers, roosting structures, adjacent lighting, gravel weed substrate
TRA-619									L						Transformer, gravel pad, adjacent lighting, roosting structures
TRA-626									L						Small spill near building, gravel substrate and weeds surrounded by asphalt, adjacent lighting
TRA-653									L						Transformer, gravel substrate, sparse weeds, adjacent lighting on building walls, next to high bay door
Brass cap															Concrete adjacent to building

Site Number	Black Tern	Trumpeter Swan	White-faced Ibis	Burrowing Owl	Ferruginous Hawk	Peregrine Falcon	Loggerhead Shrike	Bald Eagle	Bats	Merriam's Shrew	Pygmy Rabbit	Sagebrush Lizard	Spadefoot toad	Game species	Comments
WAG 3															
CPP-06															Gravel substrate
CPP 13															Gravel berm, remedial action completed; swallows in area
CPP-14															Gravel substrate, former sewage lagoon; remedial action complete, no
CPP-19															Gravel and asphalt substrate, higher levels below surface, no vegetation; subsurface soil
CPP-22				L	L	L	L				M		L		Air release to areas south outside fence, sagebrush and weeds, gravel substrate inside fences
CPP-34					L	L	L		L					L	Weed cover, gravel substrate, adjacent power poles/lighting, adjacent to sewage disposal ponds
CPP-37A					L	L	L								Outside fence, weedy annuals
CPP-37B									L						Ditch with significant, periodic water, weedy annuals
CPP-39															Gravel and asphalt substrate, remedial action
CPP-40															Gravel berm, remedial action completed
CPP-42															Shallow ditch, gravel substrate, sparse weeds (Russian thistle), intermittent water
CPP-44															Gravel substrate
CPP-46															Gravel substrate
CPP-48															Gravel substrate, remedial action completed, sparse weeds (Russian thistle)
CPP-54															Gravel substrate, sparse weeds (Kochia)
CPP-55															Gravel substrate, sparse weeds (Russian thistle)

Site Number	Black Tern	Trumpeter Swan	White-faced Ibis	Burrowing Owl	Ferruginous Hawk	Peregrine Falcon	Loggerhead Shrike	Bald Eagle	Bats	Merriam's Shrew	Pygmy Rabbit	Sagebrush Lizard	Spadefoot toad	Game species	Comments
CPP-56															Gravel substrate, removal action in progress, adjacent buildings/structures
CPP-59 (2)															Gravel berms, sparse weeds (Kochia and Russian thistle)
CPP-61															Gravel substrate
CPP-65									H					H	Sewage lagoons, permanent water, lights, observed wildlife use
CPP-66															Gravel and asphalt substrates
CPP-78															Tiny area, gravel substrate and asphalt, no vegetation
CPP-84															Beneath existing building
CPP-86															Below ground, remediation in progress
CPP-87															Gravel substrate, adjacent roosting structures
CPP-88															Large general areas of contaminated soil inside fences
CPP-90															Gravel substrate, remedial action complete, adjacent roosting, little potential for exposures
CPP-93															Gravel berm
WAG 4															
CFA-01			H	H	H	M	M	L				H	M		Landfills, crested wheatgrass plantings, power lines, and fence perching
CFA-02															
CFA-03															
CFA-04			H	H	H	H	M	M			M	H	H		Unfenced, ephemeral water, native and planted communities, good perches, low activity
CFA-05			M	L	L	L		L	L	L	H		M		Unfenced, native community, gravel substrate, intermittent water, adjacent power lines

Site Number	Black Tern	Trumpeter Swan	White-faced Ibis	Burrowing Owl	Ferruginous Hawk	Peregrine Falcon	Loggerhead Shrike	Bald Eagle	Bats	Merriam's Shrew	Pygmy Rabbit	Sagebrush Lizard	Spadefoot toad	Game species	Comments
WAG 7															
SDA					M	M	M					L			Crested wheatgrass planted across SDA, mown. Basalt rip-rap along exterior berm, large rabbitbrush plants along interior/exterior berm edges. Deer sighted recently. Open areas and perches for hunting, rodents inhabit area in and around SDA. Outside areas good sagebrush habitats. Open pit, bare soil/gravel, waste crates stacked.
Low Level Waste Pit															
TSA									H			L			Buildings with gravel/disturbed areas around and between. Night lighting, poles, fences, building roost sites.
Pit 9 complex									M						Building and construction material with disturbed soil around and between. Night lighting, poles, fences, building roost sites.
Sewage Lagoons	L		L						H				M	H	No contaminants, close proximity to SDA, unfenced, native vegetation and basalt outcrops in surrounding area, ducks, avocet, killdeer, grebes, perches in vicinity.
WAG 9															
ANL-01	H	M	H						H	H		L	H	H	Industrial waste pond, periodic standing water, cattails, unfenced, waterfowl, big game, other wildlife use documented.
ANL-01A									M	H		L			Cooling tower ditch, periodic water source, cattails, doves, killdeer nest, swallows, rushes, fenced, weed control, gravel substrate, potential bat roosting in cooling towers, adjacent lighting.
ANL-01 ditch A															Ditch section from auxiliary cooling tower and intermittent surface water runoff. Gravel substrate.
ANL-01 ditch B										M					Ditch section, periodic water up to 10 gal/minute, grassland to fence, cattails, cheatgrass.
ANL-01 ditch C										L		L			Short above ground ditch section transitions to belowground, heavy weed areas, small amounts of water, gravel substrate.

Site Number	Black Tern	Trumpeter Swan	White-faced Ibis	Burrowing Owl	Ferruginous Hawk	Peregrine Falcon	Loggerhead Shrike	Bald Eagle	Bats	Merrim's Shrew	Pygmy Rabbit	Sagebrush Lizard	Spadefoot toad	Game species	Comments
ANL-04	H	M	H						H				M		Sewage lagoons, waterfowl, swallows, butterflies, nighthawk, algae, sparse shore vegetation
ANL-05				H	H	H	H				M	H	H	H	Burn pits, outside fences, sagebrush/basalt, patches of basin wildrye, adjacent to large areas of natural vegetation, poles for perches
ANL-09									M		L	M	L	L	Interceptor canal, outside fence, sparse vegetation/weeds on banks
ANL-29									L						Lift station, gravel substrate, perching structures, lighting
ANL-35									M						Lifts station discharge ditch, running water, cattails
ANL-36												L	L	L	Photo lab ditch drifted in with silt from 1994 burn area, sparse vegetation, no water
ANL-61A															PCB spill, gravel substrate adjacent building
ANL-62															Boiler building hotwell, gravel substrate, 7-ft deep, enclosed
WAG 10															
10-01 (LCCDA)				L	L	L						L			Open crested wheatgrass planting, weeds, few shrubs
10-02 (OMRE-1)												M			Area of heavy construction, D&D activity, perching poles, closed fence with crested wheatgrass plantings and scattered rabbitbrush
Fire Training N												H	M	M	Sagebrush/rabbitbrush and crested wheat grass plantings, areas of native vegetation. Near road, unfenced, adjacent to major road, adjacent power lines are single poles/w insulator/line on top
Fire Training S															
Experiment al				L	M	M	L		L			M	M	M	Surrounded by rabbitbrush and primarily crested wheatgrass, good patches of taller sagebrush
Field Station															
Rail Car															
Detonation					L	L	M		M		M	M		H	Large sagebrush in crater and along river, soil in crater probably compacted, native grass and shrubby rabbitbrush surrounding depression,

Site Number	Black Tern	Trumpeter Swan	White-faced Ibis	Burrowing Owl	Ferruginous Hawk	Peregrine Falcon	Loggerhead Shrike	Bald Eagle	Bats	Merriam's Shrew	Pygmy Rabbit	Sagebrush Lizard	Spadefoot toad	Game species	Comments
Mass Detonation Area				M	M	M	H	M		M	H	L	H		unfenced, adjacent to Big Lost River, low human activity, sign of antelope Large areas of sagebrush/rabbitbrush, canal along N boundary with burrowing activities of larger mammals (badger, etc.), antelope and rabbit sign, observed burrowing owl, fairly removed from activity, area bounded on North by Big Lost River, roosts, raptors, doves, nighthawk sightings
Unexploded ordnance east of TRA Bunker north of INTEC				L	M	M	M	M		M	H		M		Good open sagebrush/grass and ground cover, generally native habitat, rabbit and owl pellets - Concrete rubble pile covered with weedy vegetation and large sagebrush, surrounded by sagebrush/rabbitbrush – recent burrowing of larger mammals beneath concrete, rabbit sign, fairly close to power lines and poles
Craters East of CPP				M	H	M	M	L				M	L		Depressions in large crested wheatgrass seeding, also cw in craters, bounded on the east by native sagebrush/grass community – bisected by power lines – double w/ cross poles, rodent burrows in and around craters
NODA				M	H	M	H	H	M	M	M	L	H		North of firing range, area adjacent to section of Big Lost River, much reseeded area, weedy and rabbit brush, scattered sagebrush in remediated areas – Large sagebrush and narrow riparian vegetation along river, snags and juniper nearby
Fuse Burn Area				M	H	H	H	H		H	H		H		Good native sagebrush/grass areas, cultural sites, removed from activity, some crested wheatgrass plantings, rabbit and coyote sign
RWMC test area				L	M	M	H	M	M	H	H	M	H		South of Big Lost River rest stop along Highway 20, Metal fragments, no contamination associated, good sagebrush habitat – but cheatgrass in interspaces, in close proximity to Big Lost River, rodent activity, many raptors, nighthawks, flickers etc.

Site Number	Black Tern	Trumpeter Swan	White- faced Ibis	Burrowing Owl	Ferruginous Hawk	Peregrine Falcon	Loggerhead Shrike	Bald Eagle	Bats	Merriam's Shrew	Pygmy Rabbit	Sagebrush Lizard	Spadefoot toad	Game species	Comments
Juniper Mine					H	L	M	L	H		M	M		H	No pathway to receptors, good juniper habitat
Power line				M	H	M	L	L	M		M	H		II	Inert projectiles, no contaminants – generally crested wheatgrass plantings
NOTF				M	M	M	H		M		H	H		M	Along RR tracks east of RWMC, Loggerhead shrike observed, good sagebrush habitat, patches of larger, dense plants adjacent, also areas of thistle, rabbitbrush and weeds around structures and berm w/ concrete wall on N side
Land Farm									M						Cultivated bioremediation project – weeds, open, near active areas, manure mulch, facilities/substation for roosting, night lighting in vicinity
H = High M = Medium L = Low															

DRAFT

Table . Habitat value of some CERCLA sites at some INEEL WAGs for selected sensitive species.

	WAG 1 7 sites	WAG 2 16 sites	WAG 3 30 sites	WAG 4 12 sites	WAG 5 16 sites	WAG 6 1 site	WAG 7 5 sites	WAG 9 12 sites	WAG 10 16 sites
Black tern	n						n	n	
Trumpeter swan								n	
White faced ibis	g						n	n	
Burrowing owl	t	g	n	n	t	u		n	t
Ferruginous hawk	u	g	n	g	t	u	n	n	u
Peregrine falcon	u	g	n	g	t	u	n	n	u
Loggerhead shrike	u	g	n	g	t	u	n	n	t
Bald eagle	t	n		n	t				n
Bats	t	u	n	g	t	u	t	g	u
Merriam's shrew	n			n	n			g	n
Pygmy rabbit			n	n	g	u		n	t
Sagebrush lizard	s	g	n	g	u	u	g	g	u
Spadefoot toad	n	n					n	n	n
Game species	u	g	n	g	u	u	n	g	u

n > 0% to ≤ 25% of the sites have at least one positive habitat attribute.
g > 25% to ≤ 50% of the sites have at least one positive habitat attribute.
t > 50% to ≤ 75% of the sites have at least one positive habitat attribute.
u > 75% to ≤ 100% of the sites have at least one positive habitat attribute.

DRAFT

Literature Cited and Important References

- Ahlen. 1980. Field identification of bats and survey methods based on sounds. *Myotis* 18-19:128-136.
- Ahlen. 1990. Identification of Bats in Flight. Swedish Society for Conservation of Nature, Stockholm, Sweden. 55 pp.
- Armstrong, D. M., and J. K. Jones, Jr. 1971. *Sorex merriami*. Mammalian Species, Special Publications, American Society of Mammalogists 2:102.
- Belthoff, J. R., L. R. Powers, and T. D. Reynolds. 1998. Breeding birds at the Idaho National Engineering and Environmental Laboratory, 1985 - 1991. *Great Basin Naturalist* 58:167-183.
- Bosworth, W. R. 1994. Characteristics of winter activity in *Plecotus townsendii* in southeastern Idaho. M.S. Thesis, Idaho State University, Pocatello. 74 pp.
- Bosworth, W. R. 1996. Methods for monitoring bat population trends at lava-tube caves on the Idaho National Engineering Laboratory. Environmental Science and Research Foundation Technical Report number 13. 17 pp.
- Cieminski, K. L. 1993. Wildlife use of wastewater ponds at the Idaho National Engineering Laboratory. M.S. Thesis, South Dakota State University, Brookings. 233 pp.
- Cholewa, A. F. and D. M. Henderson. 1984. A Survey and Assessment of the Rare Vascular Plants of the Idaho National Engineering Laboratory, DOE/ID-12100. U.S. Department of Energy, Radiological and Environmental Sciences Laboratory, Idaho Falls, ID.
- Craig, T. H. 1977. A car survey of raptors in southeastern Idaho 1974-76. *Raptor Research* 12:40-45.
- Craig, T. H. 1979. The raptors of the Idaho National Engineering Laboratory Site. IDO-12089. U.S. Department of Energy, Idaho Falls, ID. 28 pp.
- Craig, T. H., E. H. Craig, and L. R. Powers. 1984. Recent changes in buteo abundance in southeastern Idaho. *Murrelet* 65:95-93.
- Cronquist, A., A. H. Holmgren, N. H. Holmgren and J. L. Reveal. 1972. *Intermountain Flora* Vol. 1. New York Botanical Garden, Bronx, N.Y.
- Cronquist, A., A. H. Holmgren, N. H. Holmgren, J. L. Reveal and P. K. Holmgren. 1977. *Intermountain Flora* Vol. 6. New York Botanical Garden, Bronx, N.Y.
- Cronquist, A., A. H. Holmgren, N. H. Holmgren, J. L. Reveal and P. K. Holmgren. 1984. *Intermountain Flora* Vol. 4. New York Botanical Garden, Bronx, N.Y.
- Cronquist, A., A. H. Holmgren, N. H. Holmgren, J. L. Reveal and P. K. Holmgren. 1989. *Intermountain Flora* Vol. 3, part B. New York Botanical Garden, Bronx, N.Y.
- Cronquist, M. O. and J. W. Thompson. 1955. *Vascular Plants of the Pacific Northwest*, Volumes 1-5. University of Washington Press, Seattle, WA.
- Davis, R. J. 1952. *Flora of Idaho*. Wm. C. Brown Co., Dubuque, IA.
- Davis, W. B. 1939. *The recent mammals of Idaho*. Caxton Printers, Limited, Caldwell, Idaho. 400 pp.
- Dobkin, D. S. 1994. Conservation and management of neotropical landbirds in the Northern Rockies and Great Plains. University of Idaho Press, Moscow. 220 pp.
- Fyfe, R. W. and R. R. Olendorff. 1976. Minimizing the dangers of nesting studies to raptors and other sensitive species. *Canadian Wildlife Service Occasional Paper*, No. 23. 17 pp.
- Gabler, K. I. 1997. Distribution and habitat requirements of the pygmy rabbit (*Brachylagus idahoensis*) on the Idaho National Engineering Laboratory. M.S. Thesis. Idaho State University, Pocatello. 117 p.

DRAFT

- Gannon, W. L. and M. S. Foster. 1996. Recording mammal calls. Pages 311-326 In D. E. Wilson, F. R. Cole, J. D. Nichols, R. Rudran, and M. S. Foster, eds. *Measuring and Monitoring Biological Diversity: Standard Methods for Mammals*. Smithsonian Institution Press, Washington, D.C.
- Gleason, R. S. 1978. Aspects of the breeding biology of burrowing owls in southeastern Idaho. M.S. Thesis, University of Idaho, Moscow. 47 pp.
- Green, G. A. and R. G. Anthony. 1989. Nesting success and habitat relationship of burrowing owls in the Columbia Basin, Oregon. *Condor* 91:347-354.
- Guyer, C. 1978. Comparative ecology of the Short-horned Lizard (*Phrynosoma douglassi*) and sagebrush lizard (*Sceloporus graciosus*). M.S. Thesis. Idaho State University, Pocatello, ID.
- Guyer, C. and A. D. Linder. 1985. Thermal ecology and activity patterns of the short-horned lizard (*Phrynosoma douglassi*) and sagebrush Lizard (*Sceloporus graciosus*) in southeastern Idaho. *Great Basin Naturalist*, 45:607-614.
- Hansen, R. W. 1994. Raptor use of the Idaho National Engineering Laboratory. M.S. Thesis, South Dakota State University, Brookings. 127 pp.
- Haug, E. A. and A. B. Didiuk. 1993. Use of recorded calls to detect burrowing owls. *Journal of Field Ornithology* 64:188-194.
- Heady, L. T., K. I. Gabler, and J. W. Laundré. 1996. Habitat and behavior assessment of an endemic rabbit species (*Brachylagus idahoensis*) in southeastern Idaho. Presented at 1996 Conservation Biology meeting, Rhode Island.
- Hickey, M. B. C., L. Acharya, and S. Pennington. 1996. Resource partitioning by two species of vespertilionid bats (*Lasiurus cinereus* and *Lasiurus borealis*) feeding street lights. *Journal of Mammalogy* 77:325-334.
- Hitchcock, C. L. and A. Cronquist. 1973. *Flora of the Pacific Northwest*. University of Washington Press, Seattle, WA.
- Johnsgard, P. A. 1988. *North American Owls*. Smithsonian Institution, Washington D.C.
- Kalko, E. K. V., and C. O. Handley, Jr. 1992. Comparative studies of small mammal populations with transects of snap traps and pitfall arrays in southwest Virginia. *Virginia Journal of Science* 444:3-18.
- Kaminski, T. and J. Hansen. 1984. *Wolves of Central Idaho*. Montana Cooperative Wildlife Research Unit. Missoula.
- Keller, B. L., W. R. Bosworth, and R. W. Doering. 1993. Bat habitat research: final technical report. U.S. Department of Energy, Idaho Field Office, Idaho Falls. 20 pp.
- Kirkland, G. L., Jr., and P. K. Sheppard. 1994. Proposed standard protocol for sampling of small mammal communities. Pages 277-283 In J. F. Merritt, G. L. Kirkland, and P. K. Rose, eds. *Advances in the Biology of Shrews*, Special Publications of the Carnegie Museum of Natural History 18. Pittsburgh, Pennsylvania.
- Kunz, T. H., and R. A. Martin. 1982. *Plecotus townsendii*. *Mammalian Species*, Special Publications, American Society of Mammalogists 175:1-3.
- Manning, R. W., and J. K. Jones, Jr. 1989. *Myotis evotis*. *Mammalian Species*, Special Publications, American Society of Mammalogists 329:1-5.
- McComb, W. C., R. G. Anthony, and K. McGarigal. 1991. Differential vulnerability of small mammals and amphibians to two trap types and two trap baits in Pacific Northwest forests. *Northwest Science* 65:109-115.
- Merritt, J. F. 1995. Seasonal thermogenesis and changes in body mass of masked shrews, *Sorex cinereus*. *Journal of Mammalogy* 76:1020-1035.
- Mullican, T. R. 1985. Ecology of the sagebrush vole (*Lemmiscus curtatus*) in southeastern Idaho. M.S. Thesis, Idaho State University, Pocatello. 61 pp.
- Ream, R. R. and U. I. Mattson. 1982. Wolf status in the northern Rockies. Pages 362-382 In F. H. Harrington and P. C. Paquet, eds. *Wolves of the World*. Noyes, Publishing, Park Ridge, NJ.

DRAFT

- Rich, T. 1984. Habitat and nest-site selection by burrowing owls in the sagebrush steppe of Idaho. *Journal of Wildlife Management* 50:548-555.
- Singer, F. J. 1988. The ungulate prey base for large predators in Yellowstone National Park. National Park Service, Research/Resources Management Report 1.
- Stebbins, R. C. 1985. A field guide to western reptiles and amphibians. Houghton Mifflin Co., Boston, 334 pp.
- USDA, U.S. Forest Service. 1991. Forest Service Manual 2600. Wildlife, Fish, and Sensitive Plants Habitat Management. Chapter 2670, Threatened, Endangered, and Sensitive Plants and Animals. Washington D.C.
- USDA, Soil Conservation Service. 1994. The PLANTS database. National Plant Data Collection Center, Baton Rouge, LA.
- Wakeley, J. S. 1978. Factors affecting the use of hunting sites by ferruginous hawks. *Condor* 80:316-326.
- Wakenhut, M. C. 1990. Bat species overwintering in lava-tube caves in Lincoln, Gooding, Blaine, Bingham and Butte Counties, Idaho, with special reference to annual return of banded *Plecotus townsendii*. M.S. Thesis, Idaho State University, .. Pocatello. 66 pp.